

Bionotes

Quarterly Newsletter of A Biologists Confrerie

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Messages

With the global focus on Biodiversity and its Conservation, the *Bionotes* appears to be an endeavour in the right direction. This newsletter would provide budding young scientists an opportunity and a platform to air their views on this very important subject. Information sharing, exchange and its utilisation would have to be an integral part of scientific activities. Young scientists must get into this mode.

I wish it all success.

24 May, 2000.

Dr. (Mrs.) Manju Sharma
Secretary,
Department of Biotechnology,
Ministry of Science & Technology,
Government of India,
New Delhi-110 003.



Thank you for your letter forwarding the new research newsletter called "*Bionotes*". Although the subject area is different from my own technical field, I can appreciate the type of information that *Bionotes* is providing. I found the story from Mahabharata very relevant. I hope that the newsletter succeeds in attracting a large readership to make itself substantial. I am keeping a copy in the library so that my colleagues can also know about this new publication.

April 26, 2000.

Prof. Jayant V. Narlikar
Director & Homi Bhabha Professor,
Inter-University Centre for
Astronomy and Astrophysics,
Pune University Campus,
Pune - 411 007.

BIONOTES

A Quarterly Newsletter for Research notes and news concerning any aspect involving biological material.

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Honorary Editors :

Dr. R.K. Varshney,
Former Additional Director,
Zoological Survey of India, Calcutta
and
Prof. S.K. Saxena,
Former Head of the Department of Botany,
Aligarh Muslim University, Aligarh.

Calcutta Representative :

Shri Sanjit Kumar Ghosh,
Lepidoptera Section,
Zoological Survey of India,
M-Block, New Alipore,
Calcutta-700 053.

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Know Co-workers

[Members are invited to send their name, full address, field(s) of interest, no. of publications made and major findings worked out by them. Brief particulars will be published, so that like-minded workers of one field can come in touch with each other and exchange ideas and reprints of publications -Ed. *Bionotes*.]

R. Jayanthi

M.Sc., Ph.D.

Address : Section of Entomology, Sugarcane Breeding Institute, Coimbatore - 641 007 (Tamil Nadu).

Field of interest : Sugarcane Entomology. Working for the last 22 years. Interested in host plant-pest interaction; varietal resistance; insect behaviour; chemical ecology; and pest management. Designated as Senior Scientist (Entomology).

K.V. Surya Rao

M.Sc., F.M.B.A.

Address : Flat GF-1, Shri Ganesh Residency, Official Colony, 2nd Lane, Maharanipeta, Visakhapatnam - 530 002 (Andhra Pradesh).

Field of interest : Taxonomy of Molluscs (shells, snails, cowries, oysters etc.). Has done field work in many parts of India, particularly coastal region. Has studied distributional ranges of species and documented Molluscan fauna of different States/areas; with specialization in marine forms. Has published large number of papers. Visited U.S.A. and Canada.

Retired as Deputy Director and Officer-in-charge Malacology Division, Zoological Survey of India, Calcutta.

A.K.S. Chauhan

M.Sc., Ph.D. (Lucknow)

Address : Department of Botany, D.S. College, Aligarh-202 001 (U.P.).

Field of interest : Cytology and genetics, including cytosystematics. Working as the Reader and Head Deptt. of Botany in his College.

Sudhir Singh

M.Sc., Ph.D. (A.M.U.)

Address : Forest Protection Division, Institute of Rain and Moist Deciduous Forests Research, Na-ali, Jorhat-785 001 (Assam).

Field of interest : Taxonomy of insect-parasitic hymenopteran wasps, particularly family Encyrtidae. Has published several papers and a monograph. Presently working as Head of Forest Entomology Division in his Institute.

Directory of the Determiners

On undertaking any research project dealing with biological sciences, it is the first step to get the identification or determination of the concerned plant, animal or microbe specimens. This task of determination of the specimens to find out its natural order/family, genus and species/subspecies, is difficult one and is an expert's job. It has to be done very carefully and scientifically, thus, requires a lot of experience and time. Consequently, we have only a small number of determiners and in fact, for many groups, none.

Bionotes has tried to compile a preliminary list of the determiners for various bio-material. These are available in India in different Universities/Colleges/Institutes/Organisations, and have been listed according to their speciality. The first part of this list, dealing with the plants is published below. Further additions will be communicated in future issues.

Two important points may be made - firstly, the readers are advised to first write to the expert concerned and then send specimens after getting the consent. Secondly, any corrections and/or additions to this 'Directory' from the readers will be gratefully acknowledged.

Abbreviations : BSI = Botanical Survey of India; IARI = Indian Agricultural Research Institute; IBG = Indian Botanic Garden; NBRI = National Botanical Research Institute; Univ. = University.

- Ed. *Bionotes*.

Part 1. PLANTS

A. Lower Groups

- | | |
|--|---|
| <p>Bacteria - Soil bacteria : Prof. C.R. Babu, Dept. of Botany, Delhi Univ., New Delhi.</p> <p>Methane bacteria : Dr. Sethunathan and Dr. Tapan Auddaye, Central Rice Research Institute, Cuttack.</p> <p>Pathogenic bacteria : Dr. Ranjit Kumar, National Institute of Cholera & Enteric Diseases, Beliaghata, Calcutta.</p> <p>Plant pathogenic bacteria : Prof. M. Prasad, Botany Dept., Ranchi Univ., Ranchi.</p> <p>Other bacteria and Viruses : Prof. J.P. Verma, Head, Division of Microbiology & Plant Pathology, IARI, New Delhi.</p> | <p>: Prof. Chitreswar Sen, Kalyani Agricultural Univ., Mohanpur, Nadia.</p> <p>: Prof. H.N. Varma, Head, Botany Dept., Lucknow Univ., Lucknow.</p> <p>: Dr. B.P. Singh, Emeritus Scientist, NBRI, Lucknow.</p> <p>Lower Fungi : Prof. K.G. Mukherjee, Dept. of Botany, Univ. of Delhi, Delhi.</p> <p>: Dr. H.J. Chowdhary, Dy. Director, CBL, BSI, Howrah.</p> <p>: Prof. Sudhir Chandra, Botany Dept., Allahabad Univ., Allahabad.</p> <p>Higher Fungi : Prof. K. Natarajan, Dept. of Botany, Madras Univ., Chennai.</p> <p>: Prof. K.M. Lilavati, Head, Dept. of Botany, Calicut Univ., Calicut.</p> <p>: Prof. N. Samajpati, Dept. of Botany, Univ. of Calcutta, Calcutta.</p> <p>: Dr. J.R. Sharma, Scientist, Northern Circle, BSI, Dehra Dun.</p> |
| <p>: Prof. Kanak Samaddar, Dept. of Botany, Univ. of Kalyani, Nadia.</p> <p>: Prof. M.K. Das Gupta, Viswabharati Univ., Santi Niketan, Birbhum.</p> <p>: Prof. Sankar Mukhopadhyay, Director Virus Res. Centre, Kalyani Agricultural Univ., Mohanpur, Nadia.</p> | |

- Hymenomycetes : Dr. N. Samajapati, Dept. of Botany, Univ. of Calcutta, Calcutta.
- Gastromycetes : Dr. Abraham, TBGRI, Thiruvananthapuram.
- Lichens : Dr. K.P. Singh, Dy. Director, Eastern Circle, BSI, Shillong.
: Dr. G.P. Sinha, NBRI, Lucknow.
: Dr. H.R. Negay, Maharashtra Association for Cultivation of Science, Pune.
: Dr. D.K. Upriti, NBRI, Lucknow.
- Algae-Cyanophyceae : Prof. B.D. Kausik, Microbiology Division, IARI, New Delhi.
: Prof. P.K. Singh, Head, Division of Blue Green Algae, IARI, New Delhi.
: Dr. Ashok Kumar, Dept. of Botany, Banaras Hindu Univ., Varanasi.
: Dr. M.R.B. Raghavan, Ramakrishna School, Kodaikanal.
: Dr. Rashmi Nayar, NBPGRI, IARI, New Delhi.
- Chlorophyceae : Prof. P. Sharma, Burdwan Univ., Burdwan.
- Charophytes : Dr. Samir Roy, Viswabharati Univ. Santi Niketan, Birbhum.
- Bacillariophyceae : Dr. Pandey, Dept. of Botany, Banaras Hindu Univ., Varanasi.
: Dr. Venkateswarlu, Dept. of Botany, Osmania Univ., Hyderabad.
- Diatomes : Dr. S. Santra, Dept. of Ecological Studies, School of Environ. Sciences, Univ. of Kalyani, Nadia.
- Phaeophyceae and Rhodophyceae : Prof. Umamaheswara Rao, Dept. of Botany, Andhra Univ., Visakhapatnam.
- Liverworts : Dr. O.P. Mairh and Dr. A. Tiwari, Scientists, Central Salt & Marine Research Institute, Bhavnagar.
: Dr. D.K. Singh, Dy. Director, Northern Circle, BSI, Dehra Dun.
: Dr. S.C. Srivastava, Lucknow Univ., Lucknow.
- Mosses : Dr. J.N. Vohra, Ex-Dy. Director, Northern Circle, BSI, Dehra Dun.
: Dr. Giribala Pant, Dept. of Botany, Kumaon Univ., D.S.B. Campus, Nainital.
- Ferns : Prof. S.S. Bir, Punjabi Univ., Patiala.
- B. Higher Groups**
- Piperaceae : Dr. P.K. Mukherjee, Dept. of Botany, Univ. of Calcutta, Calcutta.
- Orchidaceae : Dr. P.K. Hajra, Ex-Director, BSI, Calcutta; presently at Dehra Dun.
- Poaceae : Dr. S.K. Jain, Ex-Director, BSI, Calcutta; presently at NBRI, Lucknow.
: Dr. V.J. Nair, Dy. Director, Southern Circle, BSI, Coimbatore.
- Cyperaceae : Dr. D.M. Verma, Ex-Addl. Director, BSI, Calcutta; presently at Allahabad.
- Bambusaceae : Dr. R.B. Majumdar, Ex-Regional Botanist, BSI, Calcutta.
- Araceae : Dr. Vajravellu, Ex-Dy. Director, Southern Circle, BSI, Coimbatore.
: Dr. M. Sivadasan, Dept. of Botany, Calicut Univ., Calicut.
- Arecaceae : Dr. S.K. Basu, Ex-Scientist, IBG, BSI, Howrah.



Research Notes

FIRST AUTHENTIC RECORD OF THE LAC INSECT FROM GUJARAT

R.K. VARSHNEY

Zoological Survey of India, New Alipore, Calcutta - 700 053; Present Address : A Biologists Confrerie, Raj Bhawan, Manik Chowk, Aligarh-202 001 (U.P.).

The lac insect, *Kerria lacca* (Kerr) Varshney, is widely distributed in India and neighbouring countries. In the western India, however, it is scarce. While *K. communis* (Mahdihassan) has been recorded from Maharashtra, Goa, Karnataka and Kerala, *K. lacca* has been recorded from Karnataka only, with a questionable occurrence shown in Gujarat by Varshney (1977). In fact, none of the genus or any species of lac insects has been authentically reported from Gujarat so far.

During early April 1997, the author, while surveying the scale insects with a party of the Zoological Survey of India (ZSI) Calcutta and Jodhpur centres, reached Dahegam, ca 5 km east of Gandhi Nagar, and stayed there in the Govt. 'Dehgam Rest House' (constructed in 1912-13). In the backyard of this Rest House on a tree of *Ziziphus*, probably *Z. mauritiana*, a moderate natural infection of the lac insect was found. As it was a very interesting observation, photographic evidence was kept, besides collection of some specimens in the alcohol for future study. This is, thus, the first authentic record of the occurrence of lac insect in the State of Gujarat.

Since the author superannuated soon after this visit, the specimens were passed on to the Hemiptera Section of the ZSI Calcutta, for determination of the species. Nevertheless, the observation in field supported the assumption that the population belonged to genus *Kerria*.

At present genus *Kerria* (Hemiptera : Coccoidea : Tachardiidae) is subdivided into two subgenera, *Kerria* Targ. and *Chamberliniella* Varshney. Of the former, 16 species have been reported from different parts of the world (some species, like *lacca*, have a few subspecies to them), of which 12 are reported from India (Varshney, 1997). Subsequently, another one new species, *K. sharada*, is being added to these 12, from eastern India by Mishra & Sushil (2000). The Gujarat specimens seem to be an additional population, belonging to genus *Kerria*, subgenus *Kerria*, which has to be referred as *Kerria* sp. till its specific determination.

Acknowledgments : The author thanks Dr. J.R.B. Alfred, Director ZSI Calcutta, and Dr. Q.H. Baqri, Joint Director-Incharge, Desert Regional Station, ZSI Jodhpur, for providing facilities, and to Dr. P.L. Kankane of ZSI Jodhpur, for photography and other help during the survey trip.

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Bio-war

Microbes that cause anthrax and smallpox, as well as other biological weapons, are certainly among the most repulsive means of destruction ever devised by man.

The Biological Weapons Convention that took effect 25 years ago on 26 March 1975 banned their production, storage and use for military purposes. The treaty is, however, seen by many as toothless, as it lacks a monitoring mechanism, but there are plans to change this next year.

With the 1991 Gulf War in mind, when there was concern that the Iraqi Army might make use of biological weapons, the Conference on Disarmament convened an adhoc group in 1994 to negotiate the setting up of an effective monitoring mechanism. The group is holding its 19th round of talks in Geneva and expects to put forward an additional protocol to the Convention by the autumn of 2001.

The new protocol will provide for setting up of a Biological Weapons Monitoring Organisation to undertake spot checks in the 143 member countries.

In addition, all signatories to the Convention will deliver an annual report on facilities that could in theory produce biological weapons. These would include laboratories working on new immunisation techniques.

It is now theoretically possible to produce microbes that are resistant to all known vaccines.

NITRATE DISTRIBUTION IN WHEAT, *TRITICUM AESTIVUM* CULTIVARS

Q. FARIDUDDIN, SHAZIA ALVI and B.A. BILAL

Department of Botany, Aligarh Muslim University,
Aligarh-202 002 (U.P.).

The plants are exposed to an atmosphere, having about 80% nitrogen. However, this form of nitrogen is very inert and has to be first oxidized to nitrate, and then reduced to ammonia in the plant system before being metabolized. The roots absorb nitrate from the soil and transport it with the ascending sap to various plant organs and organelles. It is selectively partitioned in various aerial parts which normally is regulated by the plant genotype and the metabolic state of the organ (Ahmad et al., 1985; Stynik et al., 1985). The present study reports the distribution of nitrate in root, stem and leaves of three cultivars of wheat, grown with uniform dose of fertilizers in the field.

Seeds of wheat (*Triticum aestivum*) cultivars HD-2009 (V_1), HD-2329 (V_2) and RAJ-3077 (V_3) were procured from the National Seed Corporation Ltd., New Delhi. The seeds after having surface sterilized with 0.01% mercuric chloride solution and washed with water, were sown with uniform basal dose of $N_{120}P_{60}K_{60}$ in the field. After 100 days of sowing, plant samples were collected and washed. They were then separated into root, stem and leaf samples. These samples were analysed for their nitrate content, following the method of Johnson & Ulrich (1950). The data were analysed statistically as described by Gomez & Gomez (1984).

Table 1 shows that the nitrate content of different plant organs of wheat significantly have varied levels of nitrate. This was true with all the three cultivars of wheat tried. The leaves contained maximum amount of nitrate while roots the minimum. This is in agreement with the observations of Kim et al. (1985) and Andrews (1986) on other crops. This selective distribution of nitrate in various parts may be due to the transport of the nitrate with ascending sap which is regulated by the metabolic state of the organ. Leaf being metabolically best sink received a larger share than other organs (Table 1). All the three varieties differed significantly in their nitrate content and V_3 retained the highest nitrate. It may be partly due to genetic variability, which might be affecting the rooting pattern and density, the rate of absorption and transport of nitrate to the metabolic state of various organs and the availability of the reducing power in the plants of the three cultivars.

Table 1. Nitrate content in different organs of plants of three cultivars of wheat

Cultivars	NO ₃ content (nm/gdw) in		
	Leaf	Stem	Root
V_1 *	86.35	60.03	42.15
V_2	81.55	63.14	39.24
V_3	92.50	58.25	47.25
C.D. at 5%	1.15	1.36	1.22

* Cultivar V_1 = HD 2009; V_2 = HD 2329; V_3 = RAJ 3077.

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Upbringing gives sense of humour

Genes can be blamed for many biological and personality traits but a sense of humour, or lack of one, is not one of them, reports Reuters quoting *New Scientist* magazine. A study of identical and non-identical twins by scientists at St Thomas' Hospital in London has shown that humour has more to do with upbringing than genetics. "It's a surprise because most personality traits have genetic components," said Tim Spector, who led the research team. "This implies that there's a lot of culture influence on humour."

EFFECT OF FOLIAR APPLICATIONS OF 2,4-D ON FLOWERING AND POLLEN TUBE GROWTH OF *CYAMOPSIS TETRAGONOLOBA* TAUB.

S.A. SALGARE

Department of Botany, Institute of Science,
Mumbai - 400 032 (Maharashtra).

Herbicide sprays are widely used to check weeds specially in fields with cash crops. (Crafts, 1946). Besides affecting weeds, these are likely to influence the pollen grains - their viability and germination (Sebastian, 1987). With this aim in view, it was considered desirable to study the effect of 2, 4-Dichlorophenoxy acetic acid (2,4-D), a commonly used herbicide on pollen tube growth in *Cyamopsis tetragonoloba* Taub., a plant known for good protein source and medicinal values.

Foliar applications of 5, 10, 25, 50, 100, 200-200-1000, 1000-1000-5000 µg/ml 2,4-D were made by an air-compressor on the pre-flowering stage (3 weeks old crop) of *C. tetragonoloba* Var. Pusa navbahar-Gawar. Effect of the herbicide on pollen tube growth of successive flowers viz. F, F-24, F-48, F-72 series, i.e. open flowers and the flower buds which require 24, 48, 72 hours to open respectively, was studied after one week of the treatment. An optimum concentration of sucrose (20% for F-24 series and 30% for F and F-72 series) was used for the germination of pollen. Successive flowers were plucked at the same time after the dehiscence of the anthers in open flowers. The pollen grains were transferred to sugar solutions soon after dehiscence of anthers. The cultures were then transferred to a moist filter chamber, stored at room temperature (23-30°C) having RH 56% and in diffuse laboratory light. The experiments were run in duplicate and average results were recorded. Observations were made after 24 hours of incubation. For measurement of the length of pollen tubes, 50 tubes were selected randomly and measured at a magnification of 100x. The data obtained was statistically analysed applying 't' test (Salgare, 1983).

The foliar applications of all the concentrations of 2, 4-D above 400 µg/ml prevented flowering in *C. tetragonoloba* (Table I). Sebastian (1987) stated that the foliar applications of all the concentrations of 2,4-D above 1 µg/ml suppressed the flowering in *Vigna mungo* in the sets which were observed after one week of treatment. This proves that *V. mungo* is more sensitive than *C. tetragonoloba*. Potentiality of pollen germinability in *C. tetragonoloba* was noted in all the 4 series investigated (Table I). Similar observations were made by Sebastian (1987).

The pollen of treated as well as untreated crop showed longer pollen tubes in F-24 and F-48 series than that of F series (Table I). These observations are also in agreement with those of Sebastian (1987). This proves that the pollen

of F-24 and F-48 series are ideal for storage and their subsequent use in plant breeding programme. Thus it is confirmed that the use of pollen of F series for storage is not recommended. This, however, could result in failure to get fertile seeds in spite of all the care taken during artificial pollination by plant breeders. Unless sterility is the main cause, failure of seed setting may be due to slow growth of the pollen tube or its early degeneration in the style.

Foliar applications of all the concentrations of 2,4-D above 50 µg/ml suppressed the germination of pollen of F and F-24 series, while even 50 µg/ml treatment of 2,4-D found to be toxic for the germination of pollen of F-48 and F-72 series (Table I). This proves that the pollen of younger flower buds are highly sensitive than those of F and F-24 series. It should be noted that even after one week of treatment even the lowest dose (5 µg/ml) of 2,4-D inhibited the pollen tube growth in all the 4 series (Table I). Sebastian (1987) stated that even the foliar application of 1 µg/ml 2,4-D inhibited the pollen tube length in all the 4 series of successive flowers of *V. mungo* in the sets which were observed after one week of treatment. Thus, it shows that pollen development and activity are more sensitive indicators of adverse factors in the botanical environment (Berg, 1973).

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Table 1, Effect of Foliar Applications of 2,4-D on Pollen tube Growth of *Cyamopsis tetragonoloba*
(Tested one week after treatment; Values given are mean $\pm$ SE of 50)

Conc. in µg/ml	Successive flowers			
	F	F-24	F-48	F-72
	Pollen Tube length in µm			
5	330.05 $\pm$ 3.00	492.70 $\pm$ 4.75	416.34 $\pm$ 3.77	86.22 $\pm$ 0.80
10	275.38 $\pm$ 2.42	466.28 $\pm$ 4.40	359.25 $\pm$ 3.39	70.50 $\pm$ 0.35
25	200.25 $\pm$ 1.79	380.05 $\pm$ 3.68	260.56 $\pm$ 2.45	45.80 $\pm$ 0.41
50	124.80 $\pm$ 1.09	275.53 $\pm$ 2.40	ng	ng
100	ng	ng	ng	ng
200	ng	ng	ng	ng
400	ng	ng	ng	ng
600	nf	nf	nf	nf
Control	345.26 $\pm$ 3.25	510.35 $\pm$ 4.83	450.00 $\pm$ 4.17	100.250 $\pm$ 0.93

nf = no flowering; ng = no pollen germination.

EVALUATION OF SERUM CHOLESTEROL DUE TO TOXICITY OF KINADON IN THE FISH *CHANNA PUNCTATUS* (BLOCH.)

VANDANA RATHORE and SURENDRA SINGH

Department of Zoology, Institute of Basic Science,
Dr. B.R. Ambedkar University,
Khandari Campus, Agra - 282 002 (U.P.).

The fishes are the most sensitive of all the aquatic animals, towards the pollutants passing through the river as wastes from adjoining settlements and industries. The accumulation of effluents becomes hazardous to the aquatic organisms and to surrounding human population. The present studies are therefore, an attempt to determine the effect of kinadon on cholesterol activity in a common fish, *Channa punctatus* (Bloch.).

Full grown specimens of *C. punctatus*, measuring 12-15 cm in length and 29-65 gm in weight, were selected for the studies. They were acclimatized at the room temperature in glass aquaria (75 x 37.5 x 37.5 cm) containing 10L non-chlorinated tap water. Kinadon containing 80% active ingredient was used. The median tolerance limit was evaluated by using short term static bioassay method (APHA, AWWA & SPCR, 1971). The serum cholesterol was estimated as described by Srivastava & Pande (1982).

The serum cholesterol after intoxication of kinadon decreased with an increase in exposure period. After 24 hours of exposure it ranged from 0.74 to 0.78 with an average of 0.757 mg/dl; after 48 hours from 0.70 to 0.71 with an average of 0.71 mg/dl; after 72 hours from 0.50 to 0.52 with an average of 0.527 mg/dl and after 96 hours from 0.45 to 0.48 with an average of 0.463 mg/dl. The decrease in the serum cholesterol level with an increase in the exposure time of kinadon is very highly significant ($P < 0.001$), at the 15 ppm sub-lethal concentration (Table 1).

In *C. punctatus* the toxicity of kinadon results in reduced activity with enormous extrusion of mucus which practically covers the body before death. This may be due to the fact that mucus hinders the exchange of the gases resulting in the deficiency of oxygen in the blood which in turn effects the general physiology of the body and results in death. This is in close agreement with Katti & Sothyanesan (1983), who observed inhibition in gonadal development in *Clarias batrachus* after exposure to 5 ppm lead nitrate for 150 days and decrease in the cholesterol and lipid levels in the brain, testes and ovary and increasing trend in the liver. Srivastava & Pande (1982) reported

Table 1. Effect of Kinadon toxicity on Serum Cholesterol of *Channa punctatus* (Bloch.)

	Exposure time in hours at 15 ppm				
	Control	24 hrs	48 hrs	72 hrs	96 hrs
Mean (Mg/dl)	0.917	0.757	0.71	0.527	0.463
S.E. (Mg/dl)	0.014*	0.012*	0.006*	0.018*	0.009*

S.E. = Standard Error ; * = $P < 0.001$.

decreasing trend in *Mystus vittatus* in the lipid and cholesterol contents in almost all the phases of seasonal reproductive cycle in the testes and the ovary under the stress on NPK, which is in conformity with the present results.

Itokawa et al. (1975) noted increase in the total cholesterol level, and the size and weight of liver in rats exposed to polychlorinated biphenyls (PCB), while in *C. punctatus* which were exposed to kinadon the serum cholesterol contents decreased. The decrease may be due to the utilization of blood in stressed fish (Rathore & Singh, 1999). Further, Rathore & Singh (2000) studied the effect of kinadon toxicity on albumin and acid phosphatase and found decrement. The present study shows that after exposure of kinadon, serum cholesterol got decreased with an increase according to the exposure time, which is highly significant ($P < 0.001$).

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NITRATE AND NITRATE REDUCTASE ACTIVITY AT DIFFERENT STAGES OF GROWTH IN THE PEA PLANT, *PISUM SATIVUM*

SHAZIA ALVI, Q. FARIDUDDIN and
DEVENDRA KUMAR

Department of Botany, Aligarh Muslim University,
Aligarh-202 002 (U.P.).

In an actively metabolizing cell, each chemical reaction constitutes a link and forms a chain leading to some stable product. Nitrogen metabolism is one of the most widely investigated aspects of plant life. The nitrate which is the commonest source of nitrogen in soil, after absorption through the roots, is reduced in plants before being metabolized to more complex forms of nitrogen. The nitrate reductase enzyme plays an important role in the reduction of nitrate to nitrite. In the present investigation, the distribution of nitrate and nitrate reductase activity in different parts of pea plant was taken into account, with a view to correlate it with the metabolic state of the cells of that region.

The seeds of pea (*Pisum sativum* cv. Azad) were procured from the National Seed Corporation Ltd., New Delhi. Healthy seeds after having surface sterilized with 0.01% mercuric chloride solution for five minutes and washed with double distilled water, were sown in soil contained in earthen pots with sandy loam soil, mixed with river sand and farm yard manure, in the ratio of 3 : 2 : 1 (v/v) respectively. Plants were irrigated with tap water, as and when required. Sampling was done at two and three leaf stages. Each plant was cut into different parts (i.e. 1st leaf from top, 1st internode, 2nd leaf, 2nd internode, 3rd leaf, 3rd internode, root base and root tip) and were analysed

for their nitrate content and nitrate reductase activity, following the methods of Johnson & Ulrich (1950) and Jaworski (1971) respectively.

It has been observed that there is a selective partitioning of the nitrate in different parts of the plants, at early stage of growth (Table 1). Most of the nitrate is retained in the young metabolically active region of the root. The nitrate content is higher in older leaf than the leaf which is still an early state of expansion and the least amount is retained in the internodal portions. This differential concentration of nitrate in various parts induces a proportionate level of nitrate reductase, because the enzyme is induced by its substrate (Afridi & Hewitt, 1964). The nitrate reductase activity is maximum in younger part of the root than the older part, whereas, older leaf has high activity than the younger leaf (Table 1). Similar preferential accumulation of nitrate and the changes in activity of nitrate reductase in different plant parts have been reported earlier by Chatterji et al. (1980) and Santaro & Magalhaes (1983) in other crops.

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Table 1. Nitrate content and nitrate reductase activity in different parts of pea plant

(Mean of three replicates $\pm$ S.E.)

Plant part	Nitrate content (nM NO ₃ /g dry weight)		Nitrate reductase activity (nM NO ₂ /g/h fresh weight)	
	Two leaf stage	Three leaf stage	Two leaf stage	Three leaf stage
1st leaf from top	112.08 $\pm$ 1.61	120.15 $\pm$ 1.60	30.34 $\pm$ 3.09	32.40 $\pm$ 1.00
1st internode	97.54 $\pm$ 1.65	102.40 $\pm$ 0.75	19.20 $\pm$ 1.05	23.20 $\pm$ 3.00
2nd leaf	120.10 $\pm$ 2.75	128.20 $\pm$ 1.60	37.90 $\pm$ 1.45	37.89 $\pm$ 0.75
2nd internode	102.40 $\pm$ 1.65	112.10 $\pm$ 2.25	24.80 $\pm$ 2.45	38.16 $\pm$ 1.27
3rd leaf	—	142.20 $\pm$ 1.50	—	49.64 $\pm$ 3.50
3rd internode	—	133.65 $\pm$ 1.46	—	44.20 $\pm$ 2.15
Root base	152.65 $\pm$ 1.85	148.05 $\pm$ 1.15	57.75 $\pm$ 0.75	54.65 $\pm$ 1.75
Root tip	160.85 $\pm$ 1.04	165.65 $\pm$ 1.70	62.15 $\pm$ 1.65	59.10 $\pm$ 2.08

CHANGES IN STARCH AND AMINO ACIDS CONTENTS IN THE SHOOT APICES OF RICE DURING FLOWERING

SUSHIL PRADHAN

Department of Botany, Balimela College of Science and Technology, Balimela - 764 051 (Orissa).

During the process of flowering in rice, biochemical changes are brought out including hormonal changes (Pradhan, 1983) and changes in protein content (Pradhan & Khan, 1985). The present study reports changes in starch and amino acids during flowering in rice.

Pure line rice seeds (*Oryza sativa* L cv BAM 11) obtained from the Regional Rice Research Station, Berhampur, Orissa, were grown in pots (Pradhan, 1983). After transplantation the plants were kept under a black cloth house and biochemical estimations were made beginning from 20th day (O Photoinductive Cycle) to 42nd day (22 PIC) at every alternate day. Starch (Hanes, 1940) and free amino acids (Folkes, 1959) were measured. Appropriate controls were maintained by giving normal light.

The floral development has been arbitrarily designated as transitional stage as stage 'O' and the vegetative stages have been designated as -1a, -1b, -1c, -1d and the reproductive stages have been designated as +1, +2, +3, +4, +5, as indicated earlier (Pradhan & Khan, 1984).

No detectable amount of starch could be identified till 30th day (10 PIC). From 32nd day (12 PIC) the content gradually increased till 42nd day (22 PIC). The increase

over the controls was statistically significant (Table 1).

Earlier it was reported by the author that accumulation of hexose and pentose sugars was maximum during flower conversion (Pradhan & Khan, 1984). It is likely that the conversion of sugars into starch starts at the time of floral conversion. This could be the reason for starch not detected during the early stages of vegetative development.

The content of free amino acids increased gradually till the age of 30th day (10 PIC) and thereafter the content declined. Thus, the content of amino acids accumulation was maximum during the time of floral conversion (Table 2). Previously it has also been reported that protein content was maximum at the time of floral conversion, i.e. stage 'O' (Pradhan & Khan, 1985). Percentage increase over the controls was significant statistically. Thus, proteins and their free amino acids accumulation were maximum at the time of flower conversion in the developmental morphogenesis. Hormones play a decisive role in floral transformation, but how the maximum concentration of amino acids could be related to flower formation through hormone production requires further investigation.

Acknowledgments : The author is thankful to the Economic Botanist, Regional Rice Research Station, Berhampur, for supply of pure line rice seeds and to the Head, Agricultural Statistics Division, Central Rice Research Institute, Cuttack, for statistical analysis of the experimental results. The author also wishes to thank the Principal, Balimela College of Science and Technology, Balimela, for library and laboratory facilities and to the University Grants Commission, New Delhi, for financial assistance.

Table 1. Effect of Photoinductive cycles on changes in Starch content in the shoot apices of Rice

(Mean of 3 replicates; Date of sowing - First Day of June)

Age of Plant * (days)	Photo induc- tive Cycle (PIC No.)	Control		Treated		Mean		Increase Over Control (%)
32	12	0.006 ± 0.001		0.100 ± 0.002		0.053 ± 0.66		1566.666
34	14	0.002	0.001	2.008	0.022	1.005	1.481	100300.000
36	16	0.020	0.002	3.204	0.086	1.612	2.251	15920.000
38	18	0.050	0.002	3.416	0.047	1.733	2.380	6732.000
40	20	0.060	0.003	3.502	0.058	1.781	2.433	5736.666
42	22	0.100	0.002	3.813	0.032	1.956	2.625	3713.000
Mean		0.039 ± 0.037		2.673 ± 1.405				

* No traceable amount of starch was available in 20 to 30 days old plants; $t = 6.495$; $P < 0.001$.

Table 2. Effect of Photoinductive cycles on changes in Amino Acids content in the shoot apices of Rice

(Mean of 3 replicates; Date of sowing - First Day of June)

Age of Plant * (days)	Photo inductive Cycle (PIC No.)	Control		Treated		Mean		Increase Over Control (%)
20	0	0.145 ± 0.019		0.145 ± 0.019		0.145 ± 0.000		0.000
22	2	0.150	0.016	0.170	0.018	0.160	0.014	13.333
24	4	0.170	0.014	0.210	0.038	0.190	0.028	23.529
26	6	0.325	0.028	0.575	0.048	0.450	0.176	76.923
28	8	0.350	0.034	0.900	0.058	0.625	0.388	157.142
30	10	0.375	0.033	1.050	0.108	0.712	0.477	180.000
32	12	0.425	0.056	1.025	0.098	0.725	0.424	141.176
34	14	0.450	0.048	1.015	0.038	0.732	0.399	125.555
36	16	0.460	0.018	1.000	0.012	0.730	0.381	117.391
38	18	0.475	0.028	0.950	0.046	0.712	0.335	100.000
40	20	0.475	0.066	0.950	0.058	0.712	0.335	100.000
42	22	0.500	0.076	0.925	0.098	0.712	0.300	85.000
Mean		0.358 ± 0.133		0.742 ± 0.363				

t = 3.393; P < 0.01.

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Garbage in Indian Cities

Some Major Cities	Garbage Generation (Tonnes per day)	Clearing Efficiency (%)
Mumbai	5800	86.20
Delhi	3880	62.37
Calcutta	3500	90.00
Chennai	2675	80.00
Bangalore	2130	84.50
Lucknow	1500	66.66
Ahmedabad	1500	80.00
Surat	1250	80.00
Patna	1000	30.00

Source : NIUA, Financing Infrastructure in India, Research Series No. 59, 1997.

ASSESSMENT OF NET PRIMARY PRODUCTIVITY OF KHARIF CROP JOWAR (*SORGHUM VULGARE*) AT AGRA

NAVIN KUMAR SHARMA

Department of Environmental Studies, School of Life Sciences, Institute of Basic Science, Dr. B.R.A. University, Agra - 282 007 (U.P.).

Recently Sharma & Sharma (1999) reported the differences in productivity of wheat in various fields around Agra. In continuation of this it is desirable to study the productivity of some kharif crop. Jowar (*Sorghum vulgare* L.) is a common crop used for food and feed. Therefore, the present studies deal with the productivity of Jowar in the same areas where earlier studies on wheat were made.

The localities with Jowar fields were selected on the basis of geographical directions. The details of monitoring and processing of plants were described earlier (Pandeya et al., 1968; Sharma & Sharma, 1999).

There has been great variations in different values of characters in different plants. Results presented in Table 1 show that highest ANP, BNP and TNP were observed in Sikandara locality and lowest ANP and TNP in Gwalior

road and BNP in Tajganj. However, the number of plants was highest in Dayalbagh while the highest yield in Gwalior road. A comparison of data in Tables 1 and 2 show that it is soil moisture level which has favoured high yield. The level of N in soil has no material effect, but levels of P and K appears to have some relation with high yield at Gwalior road (Singh & Raheja, 1960).

Moisture is the basic requirement of plant growth during summer. Therefore, it is easy to correlate high yield with higher soil moisture. These results are at variance with those reported earlier with wheat where N played an important role (Sharma & Sharma, 1999).

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Table 1. Growth performance of Kharif Crop Jowar plants at Agra

Characters *		Localities				
		Gwalior road	Tajganj	Sikandra	Bichpuri	Dayalbagh
1.	ANP in gmm ⁻²	724.00	916.44	2168.52	884.82	1801.04
2.	BNP gmm ⁻²	139.30	120.91	237.05	145.08	226.47
3.	TNP gmm ⁻²	863.31	1037.35	2405.57	1029.90	2027.51
4.	Height of plants in cm	168.00	354.00	372.00	228.00	264.00
5.	Number of plants	113.00	77.00	69.00	65.00	127.00
6.	Length of roots in cm	16.20	17.30	19.60	16.80	18.50
7.	Yield in q/ha	72.60	56.81	67.32	59.20	49.70

* ANP = Above ground net production; BNP = Below ground net production; TNP = Total net production.

Table 2. Physico - chemical analysis of Soil with Jowar at Agra

Characters		Localities				
		Gwalior road	Tajganj	Sikandra	Bichpuri	Dayalbagh
1.	Soil Moisture in percentage	18.30	15.40	14.10	11.60	7.30
2.	pH	8.95	8.85	8.90	8.80	8.70
3.	Available N in Kg/hact	295.00	229.70	313.60	306.80	428.40
4.	Available P in Kg/hact	19.30	17.50	14.80	16.90	19.40
5.	Available K in Kg/hact	177.60	131.10	154.30	226.70	178.80
6.	Organic carbon in percentage	0.62	0.53	0.68	0.58	0.75
7.	Exchangeable Na in Kg/hact	78.00	62.00	73.00	58.00	53.00
8.	Exchangeable Ca in Kg/hact	43.00	23.20	23.70	29.00	31.00

GERMINATION IN POLLEN OF THE SENSITIVE PLANT, *MIMOSA PUDICA* LINN. IN GLUCOSE

S.A. SALGARE

Department of Botany, Institute of Science,
Mumbai - 400 032 (Maharashtra).

Pollen grains of some plant germinate easily under a wide range of conditions, while in others the requirements be very exacting, failing which there may be no germination. In most cases, pollen grains do not germinate satisfactorily in water alone, but aqueous solutions of sugars, especially sucrose, with or without addition of accessory substances, produce better results. The sugar acts as an external source of nutritive material for the germination of pollen as well as for the growth of the tube. For proper germination, similarity in the osmotic concentration of the nutrient medium and that of the pollen is a prerequisite. The present study is on the sensitive plant, *Mimosa pudica* Linnaeus, which is called 'Lajwanti' or 'Chhui-Mui' in hindi.

Mimosa pudica pollens are known to germinate when calcium is provided (Kwack, 1965). However, it is not known whether glucose can support pollen germination. Therefore, in the present investigation effect of glucose on the germination of pollen of *M. pudica* is studied. Routine techniques were used in the study of pollen germination (Brink, 1924).

The results showed 2.5% pollen germination in situ; 3% germination of their pollen in tap water, while 10% germination of pollen was recorded in distilled water. Among the various concentrations (10–100%) of glucose tried, it was 10% glucose which gave maximum germination of pollen, i.e. 12%. However, 10% sugar was confirmed as an optimum concentration for *M. pudica* which produced the highest percentage of germination of pollen i.e. 13%. These results are in disagreement with the findings of Kwack (1965), who stated that the pollen of *pudica* does not germinate unless and until calcium was present in the medium.

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EFFECT OF FLY ASH ON GROWTH CHARACTERISTICS OF CHICKPEA

SHAZIA SIDDIQUI, ERA UPADHYAY and
SHAZIA ALVI

Department of Botany, Aligarh Muslim University,
Aligarh-202 002 (U.P.).

In India, majority of power generating plants are coal based, where flyash becomes a source of pollution. Its disposal is a serious problem because of quantum of daily coal utilization by power plants. It is reported that in the world about 300-350 million tonnes (mt) of flyash is produced as a result of combustion of 3000 mt of coal (Anonymous, 1992). If fly ash is to be considered for land application, it is necessary to evaluate its potential effects on crops. Present study was conducted to investigate the effect of different levels of fly ash on growth characteristics of chickpea (*Cicer arietinum*).

The seeds of chickpea (cv. Pusa 408) were obtained from the Indian Agricultural Research Institute, New Delhi and were surface sterilized with 0.1% HgCl_2 . These seeds were sown in pots filled with 1000 g soil (T_1), 800g soil + 200g fly ash (T_2), 600g soil + 400g fly ash (T_3) and 400g soil + 600g fly ash (T_4). Each treatment was replicated five times and supplied with 200 ml of water on alternate days upto day 30, thereafter the quantity of water was increased to 500 ml. Growth of plants in the form of plant length, plant fresh weight, shoot dry weight and root nodule number and nodule fresh mass were measured after 90 days of sowing (DAS). All the data were analysed statistically following the procedure as described by Gomez & Gomez (1984).

It is evident from Table 1 that growth of chickpea plant was significantly affected by fly ash amendment. The maximum response was induced by a 40% level (T_3) of fly ash, where increase in all the parameters of growth was highest. It indicates that changes exerted by fly ash at 40% level in the soil were optimal for the chickpea plant. The better growth was partly due to presence of nutrients in fly ash and their availability to plants for absorption and subsequent utilization. However, the possibility of fly ash neutralising acidity of soil and thereby improving the growth of plants cannot be ruled out (Molliner & Street, 1982). Similar trend in improvement of growth and yield of crop plants has been reported by Khan & Khan (1996), Khan et al. (1997) and Siddiqi & Singh (2000). Fly ash at the level of 60% (T_4) was found harmful for plant growth (Table 1). Adverse effect of higher concentration of fly ash on plant growth and yield of several crops was also reported (Khan et al., 1997). Thy study demonstrated that lower concentrations of fly ash were beneficial for growth of chickpea plant which may ultimately increased the yield.

Table 1. Effect of fly ash on growth characteristics, root nodule number and nodule fresh weight of chickpea

Treatments	Growth of Plants			Nodulation	
	Plant length (cm)	Plant fresh weight (g)	Shoot dry weight (g)	Root nodule number	Nodule fresh mass (mg)
T ₁	45.00	15.40	1.69	48	375
T ₂	49.30	16.20	1.76	50	379
T ₃	52.50	17.50	1.93	56	388
T ₄	43.20	14.60	1.55	44	360
C.D. at 5%	1.65	0.69	0.13	3.5	5.3

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Croton

The croton is also known as the variegated laurel (*Codiaeum variegatum*). It is a colourful-leaved plant of the spurge family Euphorbiaceae. Its numerous varieties of shrubs or small trees with brilliantly coloured, glossy, leathery leaves are very popular as potted plants.

Native to Malaysia and the Pacific they occur in many parts of the world, including India. The trees reach a height of about 6 m (20 feet). Leaf colours, mostly resulting from anthocyanin in the leaf, occur solid or in combinations of green, yellow, white, orange, pink, red, crimson, and purple. The 10-15 centimetre (4-6 inch) leaves vary from linear and lance-shaped to oval and lobed, depending upon variety.

These are among the most eye-catching plants, with leaf colours of yellow, pink, red, and orange. They will wilt if the soil completely dries out. Crisp crunchy leaf ends, on the other hand indicate that the soil is too moist.

Crotons need maximum light and warmth to hold their leaves and colouration well. Although primarily thought of as bedding plants, the varicoloured coleuses, or painted nettles, can decorate a sunny window with a brilliant array of leaf patterns.

Another plant of the same family, but of a different genus, the true croton, is purging croton (*Croton tiglium*), a small tree from the seeds of which croton oil is extracted. It is native to Southeast Asia.

Brain of the Musicians

Extensive study of response to musical notes by some workers from University of Munster, Germany, has shown that the area of the brain involved is around 25 per cent larger in musicians, than in people who have never played an instrument. The subjects response to piano tones, was measured by functional magnetic source imaging and correlated with the age at which the musicians began to play. In those who began to practice before the age of nine, this effect was enhanced. Enlargement was correlated with the age at which the musicians started playing instruments and did not differ between musicians with absolute or relative pitch. These results are in line with previous work on the cortical representation of the fingers of violin players, where ten was found to be the critical age. These results when interpreted with evidence for modified somatosensory representations of the fingering digits in skilled violinists, suggest that use-dependent functional reorganization extends across the sensory cortices to reflect the pattern of sensory input processed by the subject during development of musical skill.

Views

Golden Rice

It is the Green Revolution all over again, but with a difference. The revolution of the Sixties spawned high yield rice, wheat and maize varieties, but the cereals were low in minerals and vitamins which led to the outbreak of micronutrient deficiency diseases in the Third World. Scientists at the Carnegie Institute of Washington now seem to have corrected this imbalance by developing a genetically altered rice to combat vitamin A deficiency. This should give a leg up to the fight against hunger in the developing world. The new "golden rice", the result of years of research conducted by an international team of scientists, contains transplanted genes which allow plants to produce rice kernels rich in beta-carotene – the most common source of vitamin A.

Of course, there is still some way to go before the new rice's beta-carotene genes that have survived several generations of engineered laboratory plants are put into commercially useful rice strains. But it will be well worth the wait for the millions who suffer from vitamin A deficiency. Current estimates suggest that some 400 million children and untold numbers of adults worldwide receive just enough of this vital micronutrient to stave off blindness. This is, however, not enough. In other words, these subclinical deficiencies make people vulnerable to a variety of diseases ranging from diarrhoea and measles to HIV, besides blindness. In still other words, this hidden starvation has the potential to undermine the productivity of whole populations. Indeed, it is believed that the want of vitamin A, iron and iodine slices off as much as six per cent from the GDP of the developing world.

Against the backdrop of such dismal statistics, the Asian Development Bank's warning that increasing poverty and malnutrition in the world's poorest countries could possibly lead to civil unrest suddenly seems to acquire much more credibility. So it is important for governments and aid agencies to stop deluding themselves that agriculture is a "sunset industry" and instead acknowledge that it could be the best bet yet against the spectre of a starving world. Fortunately, the Green Revolution's new *avatar* appears to be taking shape in biotech labs around the world, and the super rice is but one indicator of how science can help provide an answer to feeding the poor: by breeding new crop strains which are both high yield and rich in nutrients.

(Editorial in *The Hindustan Times*)

What we write..... and what we mean

Following phrases and their intended meanings might help one understand the mysterious language of research. These may also apply to anyone reading a Ph.D. thesis or an academic paper.

It will help the editors if we avoid language such as given first in each case. Decide to be brief and write precisely.

'A highly significant area for exploratory study'
A useless topic selected by my supervisor.

'It has long been known that' I didn't look up the reference.

'A definite trend is evident' These data are practically meaningless.

'Three of the samples were chosen for detailed study'
The other results didn't make any sense.

'In my experience' Once.

'In case after case' Twice.

'In a series of cases' Thrice.

'It is believed that' I think.

'It is generally believed that' My co-workers think so, too.

'Correct within an order of magnitude' Wrong.

'According to the statistical analysis' Rumour has it.

'A statistically oriented projection of the significance of these findings' A wild guess.

'A careful analysis of obtainable data' Other pages of notes have been misplaced.

'Needless to say' [Leave out whatever follows, since it may be repetition].

'In my opinion it is not an unjustifiable assumption that' I think.

'Rendered completely inoperative' Broken.

'It is clear that much additional work will be required before a complete understanding of this phenomenon occurs' I don't understand it.

'After additional study by my colleagues' They don't understand it either.

'A considerable amount of' Much.

'Our attention has been called to the fact that' We learnt it now.

'While it has not been possible to provide definite answers to the questions' An unsuccessful experiment, but I still hope to get it published.

'These results will be in a subsequent report' I might get around to this sometime, if pushed/funded.

'It is hoped that this study will stimulate further investigation in this field' I am no more working on it.

'Thanks are due to Ms. Gupta for assistance with the experiment and to Dr. Sharma for valuable discussions' Ms. Gupta did the laboratory work and Dr. Sharma explained to me what it meant.

(Compiled)

News

Financial Support

1. Indian National Science Academy (INSA) invites applications from Indian citizens for -
 - (i) partial financial assistance to participate in International Scientific Conferences abroad during the year 2000-2001.
 - (ii) the award of INSA-Visiting Fellowships for 2000-2001 for furtherance of their research or collaborative research and training or availing research facilities in other Institutes.
2. International Foundation for Science announces award of research grant to young scientists below 40 yrs, for doing research in the fields of Crop sciences, Forestry/ Agroforestry, Food science, Natural products, Animal products and Aquatic resources.

Further information can be obtained from : International Foundation for Sciences, Grev Turegaten 19, S-114 38 Stockholm, Sweden; or from INSA address given above.

Science Awards

Indian Science Congress Association have made the announcement of following awards for 2000-2001 :

- (i) Professor Hira Lal Chakravarty award in Botany for scientists below 40 years;
- (ii) Pran Vohra award for Agricultural scientists below the age of 35 years.

Details can be obtained from General Secretary, Indian Science Congress Association, 14, Dr. Biresh Guha Street, Calcutta-700 017.

Avoid Dissection

Those who strongly object to the dissection of animals in class room. would be happy to know that computer floppies are available now to teach the humane way.

Programmes available are :

Compuworm
Compigeon
Compuroach and
Compurabbit.

The floppies are made by the Blue Cross of India and cost about Rs. 200 per programme.

Mangrove Forests of Bangladesh

The brackish water nourishing Bangladesh's Sundarbans supports a refuge for rare species of animals but their drinking grounds are getting saltier and the mangrove forest is facing serious damage.

Royal Bengal tigers, spotted deer, wild boars, crocodiles and monkeys have been forced to move deep into the forests, away from their usual feeding habitat.

The tops of thousands of trees are dying every year in the 6,017 sq km Sundarbans area, which the UNESCO designated a World Heritage Site.

Experts blame the increasing salinity of the Gorai river, which flows through the Sundarbans, although the true causes have not yet been understood. One forest department official in Kushtia said, "We are investigating the causes of various decaying factors in the Sundarbans. But a high level of salinity is certainly a major reason."

The river is one of the many offshoots of the Ganges, known as the Padma in Bangladesh, which enter the Bay of Bengal along the Bangladesh coast.

An earlier study recorded 362 tigers, 80,000 deer, 20,000 boars, 40,000 rhesus monkeys and 20,000 otters among 42 species of mammals in the forest. It also found 315 species of birds, 59 species of reptiles, eight of amphibians and 120 of fishes.

The number of tigers has dropped by more than 200 over the last few years. Illegal poaching and old age are suggested as possible factors.

Patented Abroad

Grown and widely used in India for centuries, several agricultural and medicinal plants are being patented by the dozens in the developed countries. It is indeed a dangerous phenomenon and a threat to our biodiversity.

First it was neem, then basmati rice, kala zeera (cumin), kali mirch (pepper), ritha (soapnut tree), dudhi (*Euphorbia hirta*), and now its the turn of karela (bitter gourd), jamun (blackberry) and the baingan (brinjal) to be patented in countries like Japan, USA and China.

This means that the indigenous communities of our country who have developed the various uses of these plants, have been relegated to the third party status as per the TRIPS (Trade Related Intellectual Property Rights) agreements. We now face the situation of having to pay royalty for using our own natural resources.

The injustice is being perpetrated because the intellectual achievements of our local and indigenous communities are not recognised and legally protected in the country. Legislation should be moved as soon as possible to fill this huge loophole. There is need for the Government to include patents on plants and the plant products in the list of nonpatentable items as they are not within the ambits of inventions to qualify for patenting. We also need to make efforts to mobilise developing countries to demand a linkage between the TRIPS and the CBD.

Farakka Barrage and Hilsa

The Farakka barrage in West Bengal, whose basic purpose was to divert water to the Hooghly to save the Calcutta port, has ended up affecting the hilsa fish population in Bihar, Uttar Pradesh and even Delhi over the years.

The hilsa migrates from a region around the Thailand sea and goes up the Ganga through the Bay of Bengal against the current to find a suitable place in the river for breeding. Authorities had created a "Fish ladder" (gate 24) at the dam site to help them climb through, but the hilsa are finding the current too much to handle. The fish can swim in a current of up to 2 km per hour, but that around the fish ladder is around 4 km per hour.

Now a government-appointed committee has advised the Farakka Dam authorities to open six other gates (no. 95 to 100) during the monsoon season, where the current is slower. Sources said the dam authorities have agreed to open some gates during the period.

The extent of upstream migration and breeding ground of the species have drastically reduced in the middle and lower stretches of the Ganga after the barrage became operational around 1975. Sources say they have become extinct in the Yamuna in Delhi. Before Farakka was built, the hilsa of the Ganga migrated as far as Agra and Delhi in years of excessive abundance, indicating a very long range of migration.

Goat of the Barren Island

In the Andamans, Barren Island is home to the only active volcano in the country. A feral goat - nomadic, untamed has survived the volcano's eruptions by migrating to the unaffected side of the island, feeding on its sparse foliage and surviving, no, thriving, on seawater. Yes, seawater!

Dr. S.P.S. Ahlawat, Director of the Central Agricultural Research Institute in Port Blair, says few other animals have been known to withstand the vagaries of such a harsh environment. Research on the feral goat could have wide reaching implications for the world in general and India in particular.

The feral goat could be the answer to the livestock problems of drought-affected regions, where fresh water is in short supply. Secondly, research work on its kidney, which has adapted to the highly saline seawater, could yield rich results. Remember, drinking saline water can kill a human being in a matter of days. Feral goats could be bred in "zero management farms" that can provide enormous quantities of mutton at next to no cost.

Trade in animal body parts

Uttar Pradesh forest department has sought a CBI probe into one of the biggest hauls of endangered animal hides worth several crores of rupees in Khaga town of Fatehpur district in the state.

The operation involved the states of Madhya Pradesh, Maharashtra, besides Delhi which had been found to be the focal point of striking deals for smuggling of the finished products into the international market, a department spokesman said, adding the central intelligence agencies should pool in their resources to investigate the case.

Eight members of an inter-state gang operating in the international market were arrested in Khaga town of Fatehpur district, following the recovery of tiger, leopard and black buck skins besides nails, teeth, jaws and paws of these endangered animals.

Three tiger, 40 leopard and five otter skins were seized during a raid at Ghaziabad in December 1999, which gave a clue to the wider operation being carried out by a skin treatment plant in Khaga town, the Chief Conservator of Forest (Wildlife) said.

Five people were arrested, including one Raj Kumar from Delhi, who confessed being in possession of hides in Khaga, one of the major tannery centres, besides Kanpur, in the country,

The Fatehpur district police, along with forest officials, in a major breakthrough had raided the house of one Azizullah and his six accomplices, including a woman, and seized tiger, leopard and blackbuck skins, besides nails and teeth.

Another person Atiqullah was arrested and three gunny bags filled with jaws, paws and teeth were taken out from a pond in Khaga town, District Police Chief of Fatehpur, said.

Preliminary investigations into the recovery of the hides of the endangered animals, have revealed that these animals were killed by the "locals", including the tribals residing in and around the periphery of National Parks and Sanctuaries in different parts of the country.

These animals strayed into the human settlements for lack of proper boundary walls and were later poisoned to death by the locals. Lured by the traders involved in the international racket and gang of smugglers, wild animals were poisoned to death by giving insecticides. There had been no injury mark in the skins recovered in Ghaziabad and Fatehpur.

A report from the Indian Veterinary Research Institute, Bareilly, has confirmed poisoning by insecticides in the case of five tiger deaths in Dudhwa and Corbett Parks in 1998.

New Publications

Journal Review

Global Issues - Electronic Journal. Published by the US Embassy, 24 Kasturba Gandhi Marg, New Delhi-110 001. April 2000 issue: 39 pp.

The April 2000 issue of '*Electronic Journal-Global Issues*' is a good compilation of articles on U.S. Government's views and the work done in United States of America on Green Cities-a global issue. In its first part three articles focus the subject. The second part is a sort of commentary/interviews with experts on the attempts being made by the United States to fight the pollution on global basis. A model city in the Country which has received the international attention has been highlighted. Lastly how the sustainable development in this direction has been described.

The opening article is by George T. Frampton Jr., Acting Chair of White House Council on Environmental Quality. It advises the administration on how to achieve sustainability in U.S. Communities by crafting a balance between economic growth and environmental protection. The Council argues that instead on choosing one or the other, both can be chosen on mutually reinforcing. The economic growth and environmental protection can and must go hand in hand and further without the one the other cannot be achieved.

Various administrative measures in force in the U.S. have been highlighted. Some of the important ones include:

- The development of alternative transportation methods to avoid air pollution by petrol, diesel etc.
- Creation of cooperation between the different communities and awareness.
- Development of parks and preservation of open spaces to improve the environment.
- Development of highways to avoid congestion.
- Cleaning the abandoned industrial sites.

Rodney E. Stater, U.S. Secretary of Transportation emphasises the need to develop transportation for mobility of passengers and freight in ways that keep away air, water and noise pollution and help to preserve historic and natural resources.

The USAID (U.S. Agency for International Development) programme supports the work to be done for reducing pollution. In India too, U.S. Asia Environmental Partnership has initiated a USAID regional programme and provided grants. In Hyderabad, the Centre for Resource Education worked with Ravela Timber group to propose process improvements that decreased resource waste and improved working conditions while optimising energy use and cutting production costs. These are the views expressed by David F. Hales of U.S. Agency for International Development.

The second - a commentary deals with Green ideas for Pollution control in Developing nations with an interview with David Wheeler, Lead Economist for Infra-structure/

Environment Team of the World Bank's Development Research group.

Charles Porter discusses how USAID programme supports partnership between U.S. and International cities like Johannesburg in South Africa, Lusaka, Zambia etc.

In the last sustainable development is discussed with the help of excerpts from the report submitted in 1999 to the U.S. President on building Livable communities for 21st Century. The report in a way attempts to articulate the goal of sustainable America in terms of concrete ideas to eliminate pollution. It highlights approaches that work and has built consensus around innovative ideas.

The editors of the Journal have strongly requested the readers of these articles to consider some of the innovative and effective strategies currently emerging in the USA and internationally, to avoid or mitigate the damage caused by pollution ever more important "ecological foot print."

In the end a list of books, documents and articles (a bibliography) is given for reference work.

Selected Internet resources are given here for different components or aspects of pollution control. The list is as follows for those who are interested and have facility of Internet.

1. Center of Excellence for Sustainable Development, A Project of the U.S. Department of Energy
<http://www.sustainable.doe.gov>.

2. Center on Urban and Metropolitan Policy at Brookings Institute
<http://www.brook.edu/urban>

3. Cities Environment Reports on the Internet (CEROI)
<http://www.grida.no/city/>

4. Clean Water Action Plan
<http://cleanwater.gov/>

5. Council on Environmental Quality
<http://www.whitehouse.gov/CEQ/>

6. Joint Center for Sustainable Communities; The U.S. Conference of Mayors and the National Association of Counties
<http://www.usmayors.org/>

7. The Mega Cities Project
<http://www.megacities.org/>

8. New Ideas in Pollution Regulation (NIPR). The world Bank group
<http://www.worldbank.org/nipr/index.htm>

9. Sustainable Communities Network
<http://www.sustainable.org/>

10. Urban Land Institute
<http://www.uli.org>

11. The virtual Library on Urban Environmental Management
<http://www.soc.titech.ac.jp/uem/>

- S.K. Saxena

Books

1. *Saffron*, by Moshe Neghi (Ed.). Harwood Academic Publishers, Amsteildijk 166, 1079, L.H. Amsterdam, The Netherlands.
2. *Wetland Birds : Habitat resources and Conservation implications*, by Milton W. Weller. 1999. 271 pp. Price \$ 74.95. Cambridge University Press, New York.
3. *The Terrestrial Biosphere and Global Change : Implications for Natural and Managed Ecosystems*, by Brian Walker, Will Steffen, Josep Canadell & John Ingram (Eds.). 1999. 439 pp. Price \$ 110.00. Cambridge University Press, New York.
4. *Plant Biochemistry and Molecular Biology*, by P.J. Lea and R.C. Leegood. 1999. 364 pp. Price £ 60. Wiley, Sussex.
5. *Fauna of Mahanadi Estuary, Orissa*. 1998. 218 pp. Price Rs. 400, \$ 25. Zoological Survey of India, Calcutta.
6. *Check list of Freshwater Fishes*, by A.G.K. Menon. Occ. Paper No. 175. 1999. Price Rs. 500, \$ 300. Zoological Survey of India, Calcutta.
7. *A Catalogue on Chromosome numbers of Indian Mammals* (Parts 1 and 2), by A.K. Singh, R. Banerjee and R.K. Kacker. Occ. Paper no. 176. 1999. 82 pp. Price Rs. 250, \$ 15. Zoological Survey of India, Calcutta.
8. *Indian Testudines*, by B.K. Tikader and R.C. Sharma. 2nd Edition. 1998. 156 pp. Price Rs. 300, \$ 50. Zoological Survey of India, Calcutta.
9. *Plant Amino acids : Biochemistry and Biotechnology*, by Bijay K. Singh (Ed.). 1998. 648 pp. Price \$ 195. Marcel Dekker Inc., 207 Madison Ave., New York.
10. *Bugs in the System : Re-designing the Pesticide industry for Sustainable Agriculture*, by W. Vorley and D. Keeney. 1998. 222 pp. Price \$ 69.95. Earthscan Publ. Ltd., London.

Bark of Pine for Heart Strokes

The bark of Pine trees may check heart strokes. In United States of America, the scientists have found that extracts of Pine trees might provide protection against heart attacks and strokes. The researches in Germany found that an antioxidant blend called 'pyenogenol' is probably the key chemical. The bark extract when administered had reduced 'platelet aggregation'.

Conferences

Coming Events

1. A Focussed Workshop on 'DNA Fingerprinting in Forensics and Wildlife' will be held during 17-27 July, 2000. Contact : Dr. G.V. Rao, Centre for DNA Fingerprinting and Diagnostics, ECIL Road, Nacharam, Hyderabad-500 076.
2. 'Biotechnology 2000' will be held during 3-8 Sept., 2000. Contact : V. Dechemae, 11th IBS Theodor Heuss Allee 25 D 60486, Frankfurt-am-Main, Germany.
3. 'International Commemorative Symposium : 70th Anniversary of the Japanese Society of Fisheries Science', in Yokohama from October 1 to 5, 2000. Contact : Dr. Tashiaki Oshima, Tokyo University of Fisheries, Konan 4-5-7 Minato, Tokyo 108-8477, Japan.
11. *Agricultural Ethics : Research, Teaching and Public Policy*, by Paul B. Thompson. 1998. 239 pp. Price \$ 49.95. Iowa State University Press, South State Ave., Ames, IA.
12. *Natural Products from Plants*, by Peter B. Kaufman, Harry L. Briemann, Leland J. Cseke, Sara Warber and James A. Duke. 1998. 400 pp. Price \$ 124.95. CRC Press, 200 Corporate Blvd., NW. Boca Raton, FL., USA.
13. *Plant-Microbe Interactions and Biological Control*, by G.L. Boland and L.D. Kuykendall. 1997. 464 pp. Price \$ 165.00 Marcel Dekker, 270 Madison Ave., New York.
14. *Wheat Production and Utilization - Systems, Quality and the Environment*, by M.J. Gooding and W.P. Davies. 1997. 355 pp. Price \$ 95.00. CAB International, 198, Madison Ave., New York.
15. *Interrelation between Insects and Plants*, by Pierre Jolivet. 1998. 336 pp. Price \$ 59.95. CRC Press, 200 Corporate Blvd., NW., Boca Raton, FL., USA.
16. *Tropical Fruits*, by H.Y. Nakasone and R.E. Paul. 1998. 445 pp. Price \$ 55.00. CAB International, 198, Madison Ave., New York.

If the contents of this issue look interesting to you, please join our membership. See Page 24.

CONTENTS

	Page		Page
Messages	23	<i>sativum</i> , by Shazia Alvi, Q. Fariduddin and Devendra Kumar	31
Know Co-workers	24	Changes in starch and amino acids contents in the shoot apices of Rice during flowering, by Sushil Pradhan	32
Directory of the Determiners		Assessment of net primary productivity of Kharif crop Jowar (<i>Sorghum vulgare</i>) at Agra, by Navin Kumar Sharma	34
Part I. Plants	25	Germination in pollen of the sensitive plant, <i>Mimosa pudica</i> Linn. in glucose, by S.A. Salgare	35
First authentic record of the Lac insect from Gujarat, by R.K. Varshney	27	Effect of fly ash on growth characteristics of chickpea, by Shazia Siddiqui, Era Upadhyay and Shazia Alvi	35
Nitrate distribution in wheat, <i>Triticum aestivum</i> cultivars, by Q. Fariduddin, Shazia Alvi and B.A. Bilal	28	Views	37
Effect of foliar applications of 2,4-D on flowering and pollen tube growth of <i>Cyamopsis tetragonoloba</i> Taub., by S.A. Salgare	29	News	27, 28, 33, 36, 38, 39, 41
Evaluation of serum cholesterol due to toxicity of Kinadon in the fish <i>Channa punctatus</i> (Bloch.), by Vandana Rathore and Surendra Singh	30	New Publications	40
Nitrate and nitrate reductase activity at different stages of growth in the pea plant, <i>Pisum</i>		Conferences	41

Information to the Contributors

Except invited articles, only short notes not exceeding 4 pages (typed in double space) may be sent for publication. Two copies of the mss. are desirable. The contents of the note shall be clear and written precisely. Significance of the work should be highlighted. Figures and tables should be kept to the minimum, which may yet be deleted by the editors. Only essential references, complete in all respect, be included in the following style for papers and books respectively:

- Smetacek, P. 1999. Notes on species of *Phalera* moths from the Kumaon Himalaya. *Bionotes*, 1: 8-10.
- McMillan, J. & Suter, P.J. 1963. Thin layer chromatography of gibberellins. *Nature*, 97 : 790.
- Odum, E. 1971. *Fundamentals of Ecology*. W.B. Saunders Co., New York.
- Roonwal, M.L. 1982. Fauna of the Great Indian desert. In : *Desert Resources and Technology* (Ed. A. Singh). Scientific Publishers, Jodhpur : 1-86.

No proofs will be sent to the authors, hence please submit the final version of the mss. All authors and coauthors are requested to become our members.

News and announcements regarding seminars, symposia etc., new books and journals, and letters discussing biology related matters are invited. Brief Project reports and Priority notes are also welcome. These may, however, be shortened by editors.

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All correspondence, remittances, books for review, advertisements, exchange journals etc. may please be addressed to :

Dr. R.K. Varshney, A Biologists Confrerie,
Raj Bhawan, Manik Chowk, Aligarh (U.P.)-202 001.